



## **Supporting Document 1-10**

# **Transportation Existing Conditions Report**

Eastern Ontario Waste Handling Facility Future  
Development Environmental Assessment

GFL Environmental Inc.

*Moose Creek, Ontario*

February 16, 2021

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## Acknowledgements

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# Executive Summary

## Introduction

HDR Corporation has been retained to undertake the Transportation Existing Conditions Report in support of the Environmental Assessment for the future development of the GFL Environmental Inc. (GFL) Eastern Ontario Waste Handling Facility located at 17125 Laflèche Road, Moose Creek. The subject site is located south-west of the junction of Highway 417 and Highway 138 in eastern Ontario, on the western half of Lot 16 and Lots 17 and 18, Concession 10, Township of North Stormont, United Counties of Stormont, Dundas and Glengarry. The future development is proposed to occur on the adjacent lands identified as the eastern half of Lot 16, Lots 14 and 15, and the majority of Lot 13, Concession 10.

The current Environmental Compliance Approval, issued by the Ministry of the Environment, Conservation and Parks (MECP) limits a maximum of 755,000 tonnes annually (equivalent to an average daily rate of 2,500 tonnes per day). It is expected that with the future development the landfill will continue to operate at this level. The expansion into the adjoining lands to the east would permit additional total volume which is expected to extend the current operating life of the site by approximately 20 years to 2045, but with no changes to the annual or daily tonnage restrictions.

In addition to the project to extend the operating life of the existing compost and landfill facilities on the north side of Laflèche Road (east of the existing facility), a renewable natural gas facility and a compost bagging facility are proposed on the south side of Laflèche Road, opposite the existing facility. A Zoning By-law Amendment (ZBLA) and Site Plan Application (SPA) is required for these proposed new uses. Compost and curing pads currently located north of Laflèche Road will be relocated to the area south of Laflèche Road and the relocation will not result in any changes to traffic volumes or patterns. There will be no changes to vehicle access for these relocated uses and they will continue to travel along Laflèche Road.

An existing sod farm is also currently located along Laflèche Road adjacent to the waste handling facility. The future development lands will displace the sod farm operations on the north side of Laflèche Road.

An environmental assessment is ongoing for the Highway 138 corridor, and has identified the potential for some improvements, such as passing lanes, to the south of this study area.

## Findings

### Traffic Operations

Under existing conditions there is residual capacity in the road network and there are no operational concerns to report.

### Haul Routes

The facility primary haul route currently sends most traffic along Laflèche Road to Highway 138 where traffic then goes north to Highway 417. There is some local traffic which travels south along Highway 138.

### Safety

A review of publicly available segment collision rates along Highway 138 in the vicinity of the study area does not indicate any major safety concerns when comparing the collision rates with the provincial average. The provincial average collision rate over the past 5 years of available data was 1.51 for all roadways in the province of Ontario. This was compared to the collision rate for the Highway 138 segment in the study area which had an average collision rate of 0.78. This segment of Highway 138 within the study area has a rate that is nearly half that of the provincial average, which suggests that this segment is not collision-prone under existing conditions and that there is no significant safety concern.

Detailed collision analysis at the intersection level was not performed based on the segment average being significantly less than the provincial average.

The collision rates involving trucks were not available for review as part of this study, and therefore, truck activity was not correlated to collision rates. However, as previously mentioned, the adjacent section of Highway 138 has an average collision rate that is nearly half of the provincial average. Although any increases in traffic volumes will theoretically increase the frequency of collisions, based on the data reviewed there is no indication that the increase in facility site traffic will result in any increases to collision rates (expressed as *collisions per vehicle-kilometres*).



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# 1 Introduction

HDR Corporation has been retained to undertake the Transportation Impact Study in support of the Environmental Assessment for the future development of the GFL Environmental Inc. (GFL) Eastern Ontario Waste Handling Facility (EOWHF) located at 17125 Laflèche Road. The subject site is located south-west of the junction of Highway 417 and Highway 138 in eastern Ontario, on the western half of Lot 16 and Lots 17 and 18, Concession 10, Township of North Stormont, United Counties of Stormont, Dundas and Glengarry. The future development is proposed to occur on the adjacent lands identified as the eastern half of Lot 16, Lots 14 and 15, and the majority of Lot 13, Concession 10. The site location is shown in **Exhibit 1**.

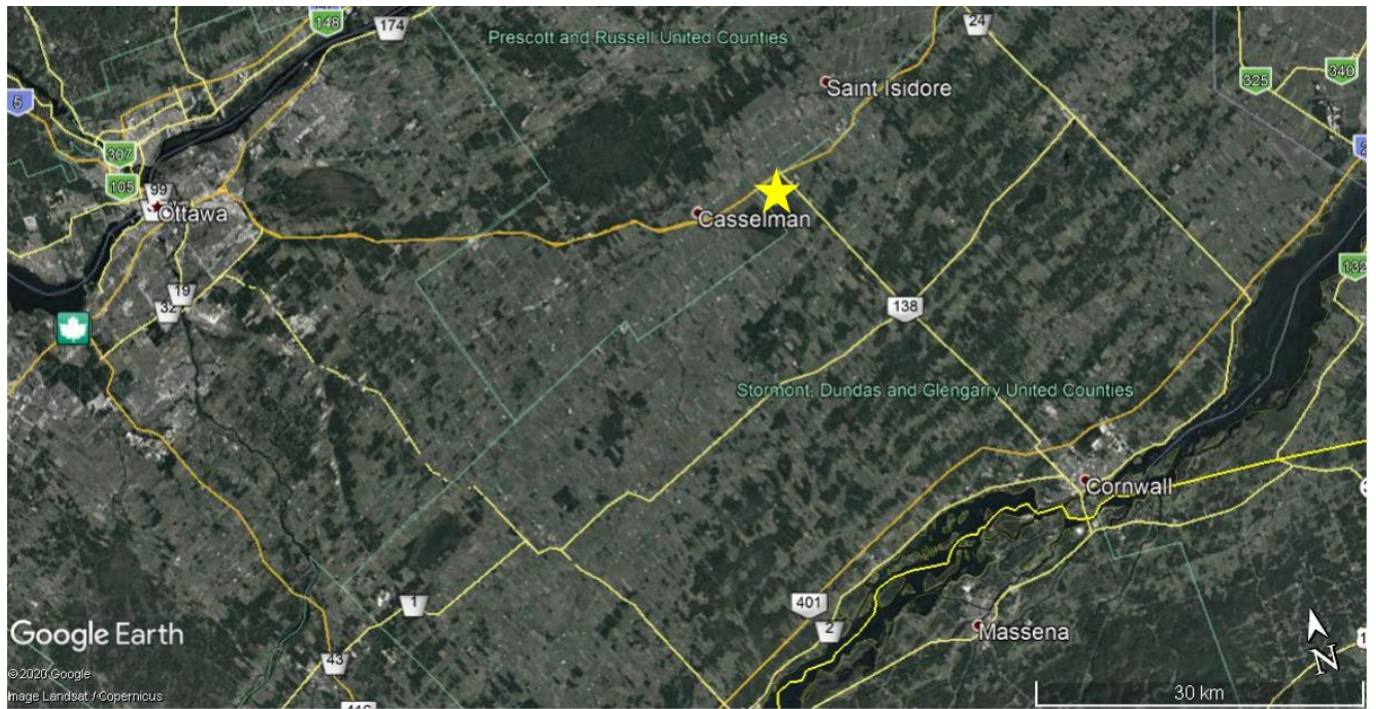
The current Environmental Compliance Approval, issued by the Ministry of the Environment, Conservation and Parks (MECP) limits a maximum of 755,000 tonnes annually (equivalent to an average daily rate of 2,500 tonnes per day). However, daily tonnage limits vary for each waste category, with a total combined daily limit of up to 4,000 tonnes for compost and landfill combined. It is expected that with the future development the landfill may continue to operate up to this maximum level of 4,000 tonnes per day, but will typically receive only 2,500 tonnes per day.

The expansion would permit additional total volume which is expected to extend the current operating life of the site approximately 20 years to 2045, but with no changes to the annual or daily tonnage restrictions.

In addition to the project to extend the operating life of the existing compost and landfill facilities on the north side of Laflèche Road (east of the existing facility), a renewable natural gas facility and a compost bagging facility are proposed on the south side of Laflèche Road, opposite the existing facility. Compost/curing pads on the north side of Laflèche Road will be maintained and shifted to the south. There will be no changes to vehicle access or travel patterns for these relocated uses and they will continue to travel along Laflèche Road.

An existing sod farm is also currently located along Laflèche Road adjacent to the waste handling facility. The future development lands will displace the sod farm operations on the north side of Laflèche Road.

This report assesses the existing transportation conditions for the facility.



**Site Context**



**Site Overview**

**Exhibit 1: Site Location**

## 1.1 Scope of Work

The scope of work has been prepared in accordance with the Ministry of Transportation of Ontario (MTO) **Guidelines for the Preparation of Traffic Impact Studies**<sup>1</sup> and was presented to the MTO as well as the United Counties of Prescott and Russell, and the United Counties of Stormont, Dundas, and Glengarry. All three agencies confirmed the following scope with no comment:

<b>Scenarios</b>	<ul style="list-style-type: none"><li>▪ Existing 2020 Traffic Conditions</li><li>▪ 2025 (5-year) Background Traffic Conditions</li><li>▪ 2035 (15-year) Background Traffic Conditions</li><li>▪ 2025 (5-year) Total Traffic Conditions</li><li>▪ 2035 (15-year) Total Traffic Conditions</li></ul>
<b>Time Periods</b>	<ul style="list-style-type: none"><li>▪ Weekday AM peak hour (between 7:00am and 9:00am)</li><li>▪ Weekday PM peak hour (between 4:00pm and 6:00pm)</li><li>▪ Saturday midday peak hour (between 10:00am and 1:00pm)</li></ul>
<b>Intersections</b>	<ul style="list-style-type: none"><li>▪ Highway 138 @ Highway 417 WB Off-Ramp</li><li>▪ Highway 138 @ Highway 417 EB Off-Ramp</li><li>▪ Highway 138 @ Laflèche Road</li><li>▪ Laflèche Road @ GFL Environmental Inc. Driveway</li></ul>

This report includes only the transportation existing conditions analysis. The future conditions analysis is under separate cover.

## 1.2 Intersection Operations and Analysis Methodology

Intersection operations were assessed for the site driveways and study intersections using the software program Synchro 9, Traffic Signal Coordination Software Version 9, which employs methodology from the Highway Capacity Manual (HCM2000) published by the Transportation Research Board National Research Council. Synchro can analyze both signalized and unsignalized intersections in a road corridor or network taking into account the spacing, interaction, queues and operations between intersections.

The signalized intersection analysis considers two separate measures of performance:

- the capacity of all intersection movements, which is based on a volume to capacity ratio; and
- the level of service for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and overall.

The two-way unsignalized intersection analysis also considers two separate measures:

- the capacity of the critical movements, which is based on a volume to capacity ratio; and
- the level of service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection.

Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter

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<sup>1</sup> <http://www.mto.gov.on.ca/english/engineering/management/corridor/tis-guideline/index.shtml>

between 'A' and 'F', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection.

## 2 Existing Conditions

### 2.1 Site Context

The existing EOWHF is bounded by Concession Road 7 to the north, property lines to the east and west, and Laflèche Road to the south. The surrounding area is predominantly undeveloped and rural. Highway 417 runs east-west to the north of Concession Road 7.

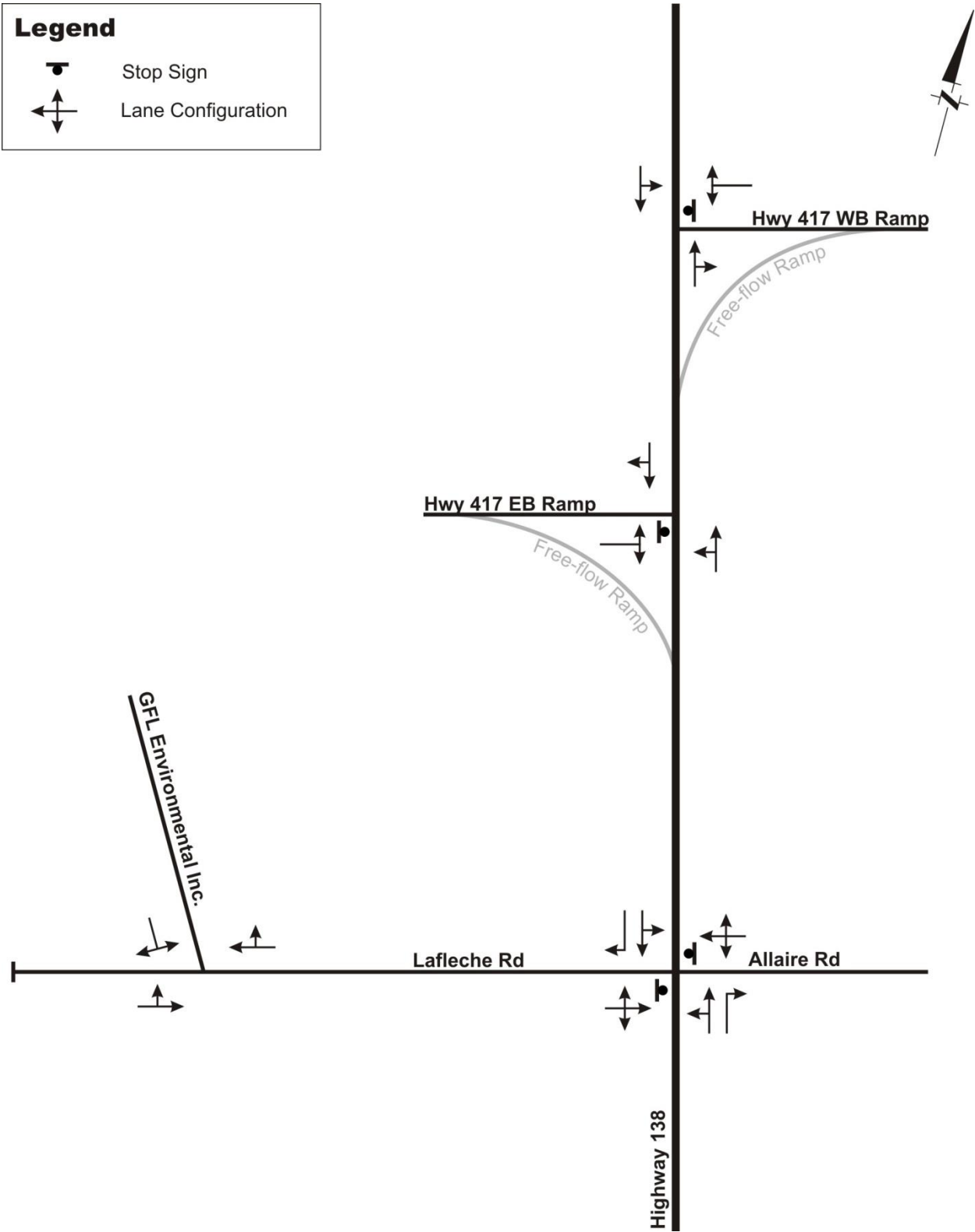
### 2.2 Existing Road Network

The existing road network is described below and is also illustrated in **Exhibit 2**.

- |                      |   |
|----------------------|---|
| <b>Laflèche Road</b> | Laflèche Road is an east-west local road under the jurisdiction of the United Counties of Stormont, Dundas, and Glengarry and has an assumed un-posted speed limit of 50 km/h. It has a two lane cross section with gravel shoulders. No sidewalk or bicycle lanes are provided. There are no posted parking restrictions.  |
| <b>Highway 138</b>   | Highway 138 is a north-south rural highway under the jurisdiction of the Ministry of Transportation of Ontario with a posted speed limit of 80 km/h. It is designated as a King's Highway and has a two lane cross section plus gravel shoulders and rumble strips at the edge of pavement as well as along the centreline. Right-turn taper is provided at Laflèche Road in the northbound and southbound directions. No sidewalk or bicycle lanes are provided. There are no posted parking restrictions. |
| <b>Highway 417</b>   | Highway 417 is an east-west controlled-access divided highway under the jurisdiction of the Ministry of Transportation of Ontario with a posted speed limit of 100 km/h. It is designated as a King's Highway and has a four lane cross section plus gravel shoulders. Off-ramps to Highway 138 are stop-controlled with the exception of the east-to-south and the north-to-west ramps, which are free-flow. Parking is not permitted.   |



Exhibit 2: Existing Road Network



## 2.3 Active Transportation and Transit

As previously mentioned, the area is predominantly rural and undeveloped and there are no dedicated pedestrian or active transportation facilities. It is expected that cyclists either share the road or use the gravel shoulders and that pedestrians utilize gravel shoulders. Pedestrians and cyclists would not be permitted on Highway 417 since it is controlled-access.

There is also no transit service directly serving the area in the vicinity of the site.

## 2.4 Existing Traffic Volumes

Due to the COVID-19 pandemic, it was not possible to conduct existing 2020 turning movement counts (TMCs) along Highway 138 that would be representative of typical traffic conditions. Therefore, available count data from 2016 was used as the basis for the projections, by adjusting the 2016 data to 2020 conditions through application of general background growth rates. The 2016 turning movement counts were performed on behalf of HDR by Traffic Survey Analysis Inc. for the weekday AM and PM peak periods (7:00am to 9:00am, and 4:00pm to 6:00pm), as well as the Saturday midday peak period (10:00am to 1:00pm). These hours represent peak traffic generation time for the waste handling facility and also the peak period of adjacent street traffic.

The TMCs along Highway 138 at Highway 417 off-ramps, as well as at Laflèche Road, were performed on Tuesday November 29<sup>th</sup> and Saturday December 3<sup>rd</sup>, 2016. Data was collected for the weigh scale access on Thursday April 16<sup>th</sup> and Saturday April 18<sup>th</sup>, 2020 to validate the 2016 data and ensure any changes in site traffic generation since 2016 were captured. It should be noted that site traffic was not expected to be impacted by the COVID-19 pandemic as it is mostly comprised of residential waste and compost.

Since the 2016 traffic counts were collected in the month of December, HDR investigated the appropriateness of adjusting the count data for seasonal variations. Using available Annual Average Daily Traffic (AADT)<sup>2</sup> and Winter Average Daily Traffic (WADT)<sup>3</sup> data for Highway 138 available online from the MTO, it was found that AADT volumes are typically 1.13 times greater than WADT volumes (based on data from 2008 to 2013). Traffic volumes for all movements at the Highway 138 and Highway 417 interchange were therefore factored by 1.13 to account for seasonality, along with the through volumes along Highway 138 at Laflèche Road. Turning movement volumes in to and out of Laflèche Road and Allaire Road were not adjusted for seasonality.

To estimate 2020 existing traffic conditions, the seasonally adjusted traffic volumes for intersections that were counted in 2016 were grown using the same methodology described in **Section 2.4.1**. The 2020 existing seasonally adjusted traffic volumes are shown in **Exhibit 3** and detailed data is provided in **Appendix A**.

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<sup>2</sup> Annual Average Daily Traffic; defined as the average twenty four hour, two way traffic for the period January 1st to December 31st.

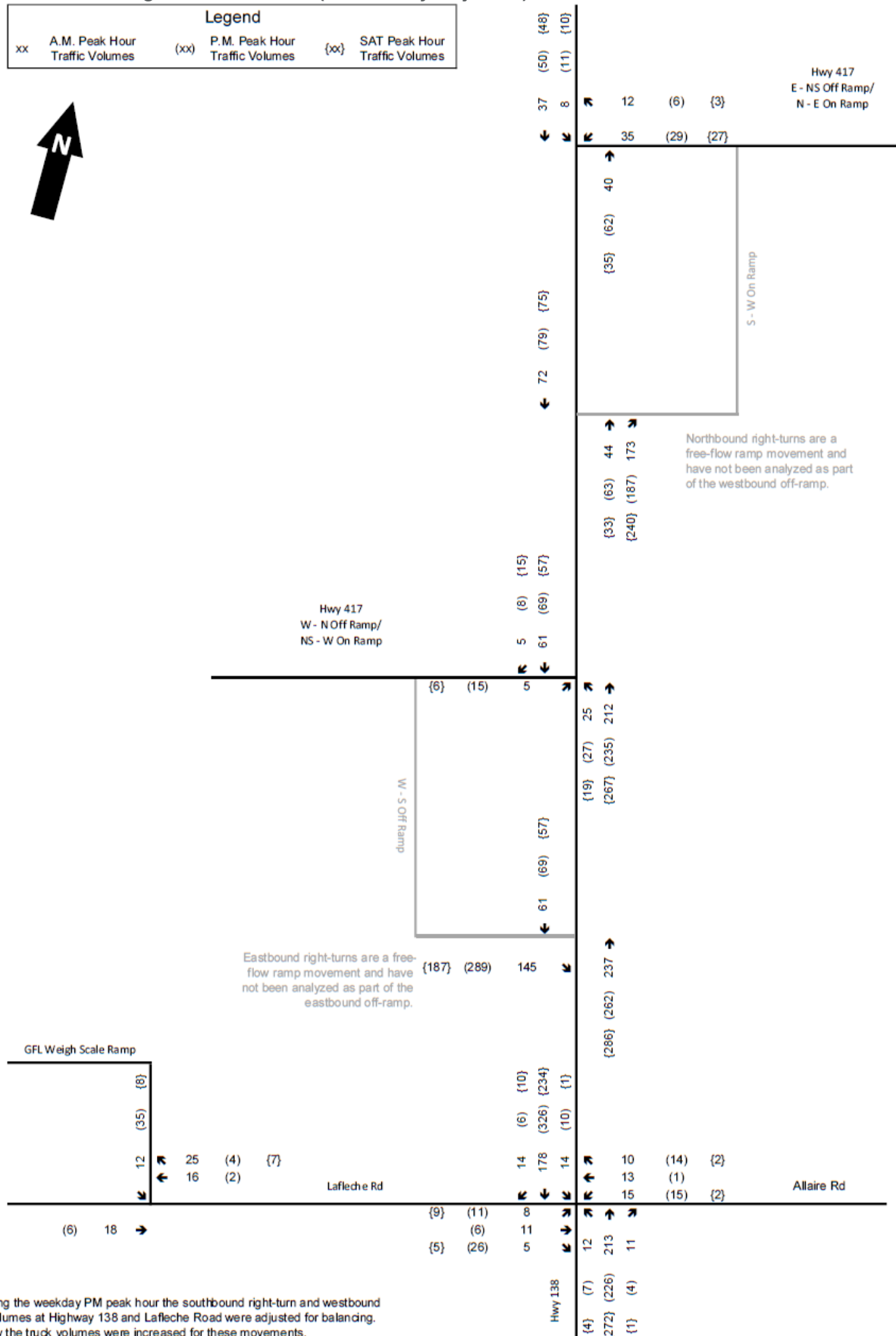
<sup>3</sup> Winter Average Daily Traffic; defined as the average twenty four hour, two way traffic for the period January 1st to March 31st, plus December 1st to December 31st, including weekends.

### **2.4.1 General Background Growth**

AADT data was available for Highway 138 and was also available for Highway 417 for the years preceding and inclusive of 2016. Using the data, growth rates were calculated for Highway 138 south of Highway 417 and along Highway 417 at the Highway 138 interchange. Since Highway 138 is a lower volume roadway (carrying approximately 30% of the volume that Highway 417 does), the growth rates from Highway 138 were relied on for all movements including those to and from Highway 417.

Along Highway 138 over a 6 year period from 2010 to 2016 there has been growth in AADTs of about 1.55% per annum. Along Highway 417, the same 6-year trend indicates that growth is very low (1.25%). For a conservative approach, a 2.0% growth was applied to all turning movement volumes, with the exception of turning movements in to and out of Laflèche Road and Allaire Road since these are local roadways. This is conservative in that it is higher than the 1.55% growth observed along Highway 138.

### Exhibit 3: 2020 Existing Traffic Volumes (Seasonally Adjusted)



## 2.5 Existing Traffic Operations

Based on the existing traffic counts shown in **Exhibit 3** and the existing road network depicted in **Exhibit 2**, existing traffic operations were assessed. Intersection operations are summarized in **Table 1**. Detailed Synchro reports are provided in **Appendix B**.

**Table 1: Existing Intersection Operations**

Intersection & Critical Movement	Weekday AM Pk Hr			Weekday PM Pk Hr			Saturday Pk Hr		
	LOS	v/c	95 <sup>th</sup>	LOS	v/c	95 <sup>th</sup>	LOS	v/c	95 <sup>th</sup>
<i>Hwy 138 / Hwy 417 WB Off-Ramp</i>									
Westbound Approach	A	0.06	1.5	A	0.05	1.2	A	0.04	0.9
Northbound Approach	0	0.03	0.0	0	0.04	0.0	0	0.02	0.0
Southbound Approach	A	0.01	0.1	A	0.01	0.2	A	0.01	0.2
<i>Hwy 138 / Hwy 417 EB Off-Ramp</i>									
Eastbound Approach	B	0.01	0.2	B	0.03	0.6	B	0.01	0.2
Northbound Approach	A	0.02	0.5	A	0.02	0.5	A	0.01	0.3
Southbound Approach	0	0.04	0.0	0	0.05	0.0	0	0.05	0.0
<i>Hwy 138 / Laflèche Rd</i>									
Eastbound Approach	B	0.07	1.6	B	0.09	2.3	B	0.03	0.7
Westbound Approach	B	0.10	2.4	B	0.07	1.7	B	0.01	0.2
Northbound Left-through	A	0.01	0.3	A	0.01	0.2	A	0.00	0.1
Northbound Right-turn	0	0.01	0.0	0	0.00	0.0	0	0.00	0.0
Southbound Left-through	A	0.01	0.3	A	0.01	0.2	A	0.00	0.0
Southbound Right-turn	0	0.01	0.0	0	0.00	0.0	0	0.01	0.0
<i>Laflèche Rd / GFL Driveway</i>									
Eastbound Approach	0	0.00	0.0	0	0.00	0.0	0	0.00	0.0
Westbound Approach	0	0.03	0.0	0	0.01	0.0	0	0.01	0.0
Southbound Approach	A	0.02	0.4	A	0.07	1.8	A	0.01	0.3

LOS – Level of Service    v/c – Volume to Capacity Ratio    95<sup>th</sup> – 95th percentile queue length in metres

Under existing conditions all movements at all study intersections are operating well with level of service 'A' or 'B' and with volume to capacity ratios of 0.10 or lower indicating that the intersection is operating well with residual capacity.

All 95<sup>th</sup> percentile queues are less than one standard vehicle length (7 metres). Due to low traffic volumes on minor approaches, there is on average less than one vehicle arriving per minute and no vehicle stacking, which is why Synchro reports the queue (in metres) as being less than 1 vehicle length. There are no operational concerns at any study intersections.

## 3 Facility Operations

### 3.1 Site Vehicular Traffic Trip Generation

#### 3.1.1 Waste Handling Facility

Weigh scale data was provided to HDR and was used to correlate the trip generation characteristics of the waste handling facility with the tonnage received. The weigh scale data provides a daily summary of all vehicles entering the facility's weigh scale, as well as the total landfill and total compost tonnage received. This data was collected on the same dates as the April 2020 TMC's that were collected at the weigh scale driveway. Traffic not passing through the weigh scale is typically comprised of employee traffic, or traffic associated with the peat extraction operation on the south side of Laflèche Road. These vehicles are not captured in the weigh scale data. The data was disaggregated into two sets (weekday and Saturday) and was separated for waste types (waste and compost).

On average, the facility accepts 2,500 tonnes per day at the landfill, however, the facility may accept up to 4,000 tonnes per day of landfill and compost when required.

On the weekday for which weigh scale data was provided, the facility received approximately 2,600 tonnes of waste and compost combined, which means the observed site traffic should be representative of, or slightly higher than, average daily operations. Furthermore, the observed traffic volumes represent approximately 65% of the daily maximum capacity. On the Saturday for which weigh scale data was provided, the facility received only 15% of the daily maximum. Saturdays consistently receive less tonnage and experience less activity than weekdays, partly as a result of having shorter operating hours (6 hours) compared to weekdays (10 hours).

Existing site trip generation is summarized in **Table 2** and **Table 3**.

**Table 2: Vehicular Peak Hour Site Trip Generation for Compost Waste**

Component	Observed Site Operations (April 2020)		
	AM	PM	SAT
Daily Tonnage	884		474
Compost % <sup>1</sup>	27.2%		76.2%
Light Inbound Trips <sup>2</sup>	1	1	3
Light Outbound Trips <sup>2</sup>	0	27	4
Est. Compost Light Inbound Trips <sup>3</sup>	0	0	2
Est. Compost Light Outbound Trips <sup>3</sup>	0	7	3
Compost Light Inbound Trip Rate (per 1000 tonnes)	0.31	0.31	4.82
Compost Light Outbound Trip Rate (per 1000 tonnes)	0	8.30	6.43
Heavy Inbound Trips <sup>2</sup>	24	3	4
Heavy Outbound Trips <sup>2</sup>	12	8	4
Est. Compost Heavy Inbound Trips <sup>3</sup>	7	1	3
Est. Compost Heavy Outbound Trips <sup>3</sup>	3	2	3
Heavy Inbound Trip Rate (per 1000 tonnes)	7.38	0.92	6.43
Heavy Outbound Trip Rate (per 1000 tonnes)	3.69	2.46	6.43
Two-way Compost Light Vehicle Trips	0	8	5
Two-way Compost Heavy Vehicle Trips	10	3	6
<b>Two-way Compost Trips</b>	<b>10</b>	<b>11</b>	<b>11</b>

Notes: Rounded values shown in table. Exact values used in calculations and trip assignment.

1) Based on the daily weigh scale summary.

2) Combined landfill and compost.

Observed values taken directly from 2020 turning movement count at the facility driveway.

3) Calculated from the turning movement count by applying the landfill-to-compost split from the weigh scale.

**Table 3: Vehicular Peak Hour Site Trip Generation for Landfill Waste**

Component	Observed Site Operations (April 2020)		
	AM	PM	SAT
Daily Tonnage	1,717		106
Landfill % <sup>1</sup>	72.8%		23.8%
Light Inbound Trips <sup>2</sup>	1	1	3
Light Outbound Trips <sup>2</sup>	0	27	4
Est. Landfill Light Inbound Trips <sup>3</sup>	1	1	1
Est. Landfill Light Outbound Trips <sup>3</sup>	0	20	1
Landfill Light Inbound Trip Rate (per 1000 tonnes)	0.42	0.42	6.72
Landfill Light Outbound Trip Rate (per 1000 tonnes)	0	11.45	8.96
Heavy Inbound Trips <sup>2</sup>	24	3	4
Heavy Outbound Trips <sup>2</sup>	12	8	4
Est. Landfill Heavy Inbound Trips <sup>3</sup>	17	2	1
Est. Landfill Heavy Outbound Trips <sup>3</sup>	9	6	1
Heavy Inbound Trip Rate (per 1000 tonnes)	10.17	1.27	8.96
Heavy Outbound Trip Rate (per 1000 tonnes)	5.09	3.39	8.96
Two-way Landfill Light Vehicle Trips	1	20	2
Two-way Landfill Heavy Vehicle Trips	26	8	2
<b>Two-way Landfill Trips</b>	<b>27</b>	<b>28</b>	<b>4</b>

Notes: Rounded values shown in table. Exact values used in calculations and trip assignment.

1) Based on the daily weigh scale summary.

2) Combined landfill and compost.

Observed values taken directly from 2020 turning movement count at the facility driveway.

3) Calculated from the turning movement count by applying the landfill-to-compost split from the weigh scale.

### 3.1.2 Total Site Traffic Generation Summary

The site trip generation is summarized in **Table 4**.

**Table 4: Facility Vehicle Trip Generation Summary**

Component	Direction	Observed Site Trips		
		AM	PM	SAT
Compost Waste Handling (Projected Maximum)				
Light Vehicles	In	0	0	2
	Out	0	7	3
Trucks	In	7	1	3
	Out	3	2	3
All Vehicles	In	7	1	5
	Out	3	9	6
	Two-way	10	10	11
Landfill Waste Handling (Projected Maximum)				
Light Vehicles	In	1	1	1
	Out	0	20	1
Trucks	In	17	2	1
	Out	9	6	1
All Vehicles	In	18	3	2
	Out	9	26	2
	Two-way	27	29	4
Compost Bagging				
Light Vehicles	In	Future operation only		
	Out			
Trucks	In			
	Out			
All Vehicles	In			
	Out			
	Two-way			
Renewable Natural Gas Facility				
Light Vehicles	In	Future operation only		
	Out			
Trucks	In			
	Out			
All Vehicles	In			
	Out			
	Two-way			
Facility Total				
Light Vehicles	In	1	1	3
	Out	0	27	4
	Two-way	1	28	7
Trucks	In	24	3	4
	Out	12	8	4
	Two-way	36	11	8
All Vehicles	In	25	4	7
	Out	12	35	8
	Two-way	37	39	15

Note: Raw trip values shown in red font. Values calculated from raw values shown in black font.

## 3.2 Site Traffic Distribution and Assignment (Haul Routes)

Based on the TMC data, traffic entering the weigh scale are predominantly trucks and heavy vehicles during the weekday peak hours, and a more balanced mixture of trucks and light vehicles during the weekend peak hour. The larger trucks will generally be traveling to/from Ottawa or to/from the south via Highway 138. The smaller personal vehicles and pick-up trucks would likely be serving the surrounding local communities. The assumed distribution and assignment of future trips matches the observed assignment at the intersection of Highway 138 and Laflèche Road based on the turning movement counts. Two separate assignments were applied to the heavy vehicles and to light vehicles. Any traffic travelling east-west across Highway 138 is associated with other businesses on the east side of Highway 138 (along Allaire Road).

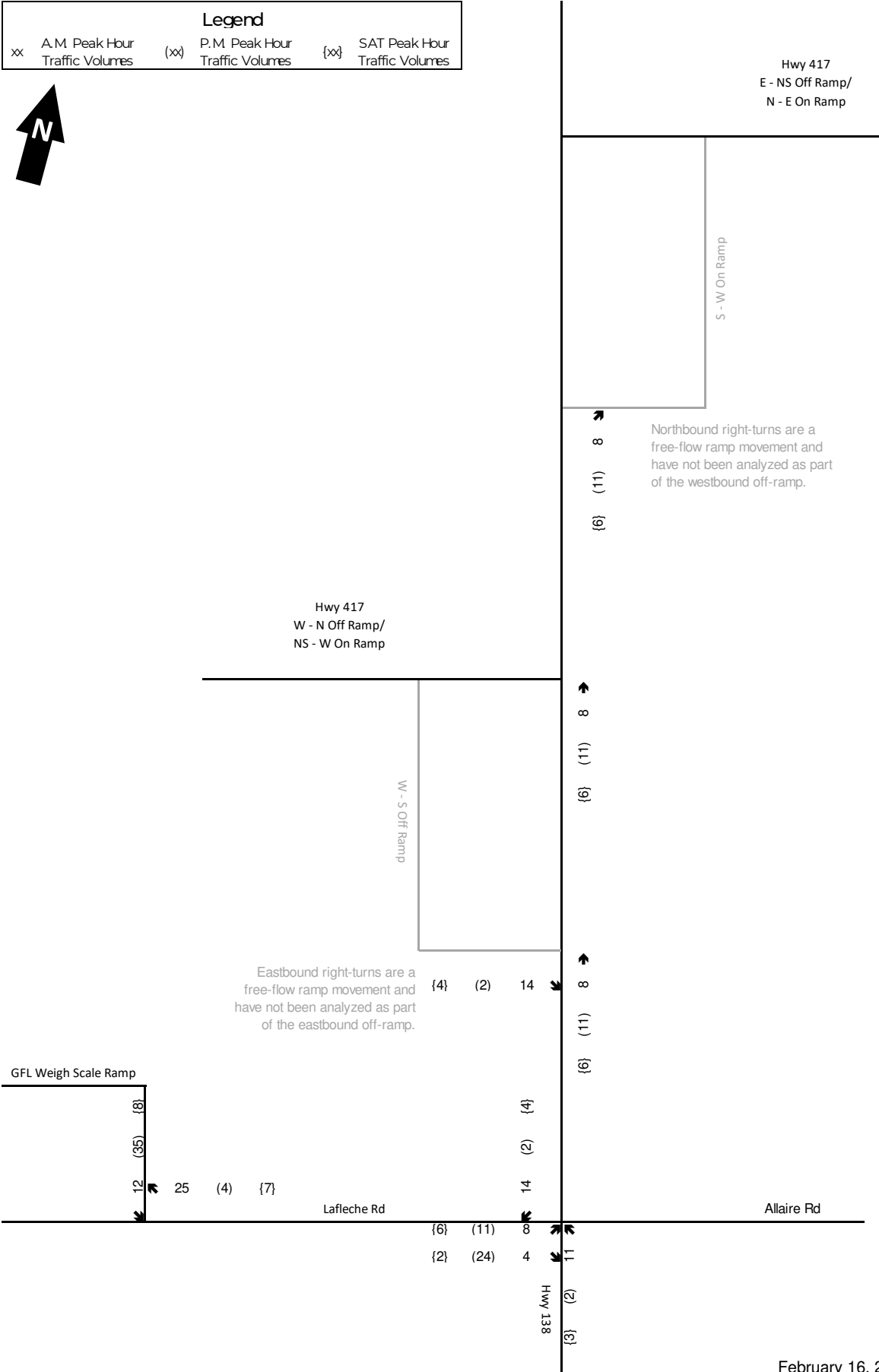
It is also noted that at the Highway 417 / Highway 138 interchange, the S-W ramp (from the south to the west) and W-S ramp (from the west to the south) are free flow, and these are the two ramps expected to be used by site traffic. Thus, site traffic will have minimal operational impact at these Highway 417 Off-ramps, with the exception of adding minor volume to the northbound through movement at the Highway 417 eastbound ramp (southerly intersection). Although site traffic was assigned to the free-flow ramps, the free-flow ramp volumes have not been included as part of the Synchro analysis since they would not impact intersection operations and are unimpeded.

The existing site traffic volumes are shown in **Exhibit 4**.

For the site traffic, a breakdown of trips by waste-type (compost versus landfill for the north side), as well as trips associated with the new south side uses (with compost bagging and renewable natural gas processing operations combined) is shown in **Appendix D**. **Appendix D** also includes a summary of site trips by vehicle type (light vs. heavy).



Exhibit 4: Existing Site Traffic (Day of TMC)



## 4 Highway 138 Accident Rates

The accident rates (AR) for the segment of Highway 138 within the study area was compared to the provincial average provided in the **Ontario Road Safety Annual Report 2017**<sup>4</sup>. The MTO defines AR as “*the number of reportable accidents occurring annually on a particular highway section for every million vehicle kilometres (MVKM) travelled on that section during the same period.*”

During the last year for which data is available (2017), the provincial average AR was 1.45. The average AR over the past 5 years (2013 to 2017) was 1.51. This provincial average refers to million vehicle kilometres for all roadways in the province (not only King’s Highways).

This was compared to the AR for the Highway 138 segment in the study area (available from the MTO<sup>5</sup>) which had an AR of 0.60 as of the most recent year for which data is available (2010). The average AR over the past 5 years beginning in 2010 was 0.78.

This segment of Highway 138 within the study area has an AR that is nearly half that of the provincial average which suggests that this segment is not collision-prone and that there is no significant safety concern. These findings may be further reviewed as part of the Highway 138 Study.

Detailed collision analysis at the intersection level was not performed based on the segment average being significantly less than the provincial average. Detailed future safety performance would rely on available safety performance functions for this specific road for the assessment of future conditions.

The collisions rates involving trucks were not available for review as part of this study, and therefore, truck activity was not correlated to collision rates. However, as previously mentioned, the adjacent section of Highway 138 has an average collision rate that is nearly half of the provincial average. Based on the data reviewed, there is no indication that the increase in truck volumes will result in any increases to collision rates.

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<sup>4</sup> <http://www.mto.gov.on.ca/english/publications/ontario-road-safety-annual-report.shtml>

<sup>5</sup> <https://www.library.mto.gov.on.ca/SydneyPLUS/TechPubs/Portal/tp/tvSplash.aspx>

## 5 Conclusions

The purpose of this study was to assess transportation existing conditions for the facility which will form the basis of the future transportation conditions assessment.

### 5.1 Haul Routes

The origin-destination patterns of vehicles travelling to or from the facility results in most site traffic traveling north along Highway 138 to Highway 417, however, some site traffic travels south along Highway 138. The existing haul routes are fairly stable and are not expected to change in the future.

### 5.2 Traffic Operations

Under existing conditions there is and will continue to be residual capacity in the road network and there are no operational concerns to report.

### 5.3 Safety

#### 5.3.1 Collision Rates

A review of publicly available segment collision rates along Highway 138 in the vicinity of the study area does not indicate any major safety concerns when comparing the collisions rates with the provincial average. The provincial average collision rate over the past 5 years of available data was 1.51 for all roadways in the province of Ontario. This was compared to the collision rate for the Highway 138 segment in the study area which had an average collision rate of 0.78. This segment of Highway 138 within the study area has a rate that is nearly half that of the provincial average, which suggests that this segment is not collision-prone under existing conditions and that there is no significant safety concern.

Detailed collision analysis at the intersection level was not performed based on the segment average being significantly less than the provincial average.

The collisions rates involving trucks were not available for review as part of this study, and therefore, truck activity was not correlated to collision rates. However, as previously mentioned, the adjacent section of Highway 138 has an average collision rate that is nearly half of the provincial average. Although any increases in traffic volumes will theoretically increase the frequency of collisions, based on the data reviewed there is no indication that the increase in facility site traffic will result in any increases to collision rates (expressed as *collisions per vehicle-kilometres*).

# **Appendix A**

## Turning Movement Counts

# Lafleche Road & GFL Scale Access 1

## Morning Peak Diagram

### Specified Period

**From:** 7:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 7:00:00

**To:** 8:00:00

**Municipality:** North Stormont

**Site #:** 0000000018

**Intersection:** Lafleche Road & GFL Scale Access

**TFR File #:** 1

**Count date:** 16-Apr-2020

### Weather conditions:

Clear

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Lafleche Road runs W/E

North Leg Total: 37

North Entering: 12

North Peds: 0

Peds Cross: 0

Heavys	0	12	12
Trucks	0	0	0
Cars	0	0	0
Totals	0	12	



Heavys 23

Trucks 1

Cars 1

Totals 25

East Leg Total: 71

East Entering: 41

East Peds: 0

Peds Cross: 0

Heavys	Trucks	Cars	Totals
12	1	3	16

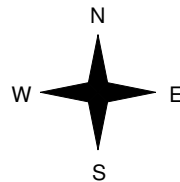


Lafleche Road

Heavys	Trucks	Cars	Totals
0	0	0	0
15	1	2	18
15	1	2	



GFL Scale Access 1



Cars	Trucks	Heavys	Totals
1	1	23	25
3	1	12	16
4	2	35	



Lafleche Road



Cars	Trucks	Heavys	Totals
2	1	27	30

Peds Cross: 0

West Peds: 0

West Entering: 18

West Leg Total: 34

## Comments

from 17:19 the road was closed on the east-west through direction

# Lafleche Road & GFL Scale Access 1

## Afternoon Peak Diagram

### Specified Period

**From:** 16:00:00

**To:** 18:00:00

### One Hour Peak

**From:** 16:15:00

**To:** 17:15:00

**Municipality:** North Stormont

**Site #:** 0000000018

**Intersection:** Lafleche Road & GFL Scale Access

**TFR File #:** 1

**Count date:** 16-Apr-2020

### Weather conditions:

Clear

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Lafleche Road runs W/E

North Leg Total: 39

North Entering: 35

North Peds: 0

Peds Cross: 0

Heavys	0	7	7
Trucks	0	1	1
Cars	0	27	27
Totals	0	35	

Heavys 3

Trucks 0

Cars 1

Totals 4

East Leg Total: 47

East Entering: 6

East Peds: 0

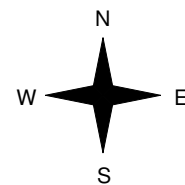
Peds Cross: 0

Heavys	Trucks	Cars	Totals
1	1	0	2



Lafleche Road

Heavys	Trucks	Cars	Totals
0	0	0	0
0	3	3	6
0	3	3	



GFL Scale Access 1

Cars	Trucks	Heavys	Totals
1	0	3	4
0	1	1	2
1	1	4	



Lafleche Road



Cars	Trucks	Heavys	Totals
30	4	7	41

Peds Cross: 0

West Peds: 0

West Entering: 6

West Leg Total: 8

## Comments

from 17:19 the road was closed on the east-west through direction

# Lafleche Road & GFL Scale Access 1

## Total Count Diagram

**Municipality:** North Stormont  
**Site #:** 0000000018  
**Intersection:** Lafleche Road & GFL Scale Access  
**TFR File #:** 1  
**Count date:** 16-Apr-2020

**Weather conditions:**  
 Clear  
**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Lafleche Road runs W/E

North Leg Total: 117  
 North Entering: 73  
 North Peds: 0  
 Peds Cross: 0

Heavys	Trucks	Cars	Totals
0	0	0	0
37	1	35	73



Heavys	Trucks	Cars	Totals
38	1	5	44

East Leg Total: 191  
 East Entering: 79  
 East Peds: 0  
 Peds Cross: 0

Heavys	Trucks	Cars	Totals
26	4	5	35



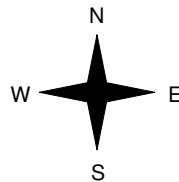
GFL Scale Access 1



Cars	Trucks	Heavys	Totals
5	1	38	44
5	4	26	35
10	5	64	



Lafleche Road



Heavys	Trucks	Cars	Totals
0	0	0	0
26	5	8	39
26	5	8	



Lafleche Road



Cars	Trucks	Heavys	Totals
43	6	63	112

Peds Cross: 0  
 West Peds: 0  
 West Entering: 39  
 West Leg Total: 74

## Comments

from 17:19 the road was closed on the east-west through direction

# Lafleche Road & GFL Scale Access 1

## Traffic Count Summary

Intersection: Lafleche Road & GFL Scale Acces					Count Date: 16-Apr-2020		Municipality: North Stormont					
North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	12	0	0	12	0	12	8:00:00	0	0	0	0	0
9:00:00	14	0	0	14	0	14	9:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	32	0	0	32	0	32	17:00:00	0	0	0	0	0
18:00:00	15	0	0	15	0	15	18:00:00	0	0	0	0	0
Totals:	73	0	0	73	0	73		0	0	0	0	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	16	25	41	0	59	8:00:00	0	18	0	18	0
9:00:00	0	15	14	29	0	41	9:00:00	0	12	0	12	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	0	4	4	8	0	14	17:00:00	0	6	0	6	0
18:00:00	0	0	1	1	0	4	18:00:00	0	3	0	3	0
Totals:	0	35	44	79	0	118		0	39	0	39	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	16:00			17:00	18:00	18:00	18:00		
Crossing Values:	0	12	14	0			32	15	15	3		

# Lafleche Road & GFL Scale Access 1

## Mid-day Peak Diagram

### Specified Period

**From:** 11:00:00

**To:** 13:00:00

### One Hour Peak

**From:** 11:30:00

**To:** 12:30:00

**Municipality:** North Stormont

**Site #:** 0000000018

**Intersection:** Lafleche Road & GFL Scale Access 1

**TFR File #:** 1

**Count date:** 18-Apr-2020

### Weather conditions:

Clear

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Lafleche Road runs W/E

North Leg Total: 15

North Entering: 8

North Peds: 0

Peds Cross: 0

Heavys	0	3	3
Trucks	0	1	1
Cars	0	4	4
<b>Totals</b>	<b>0</b>	<b>8</b>	

Heavys	3
Trucks	1
Cars	3
<b>Totals</b>	<b>7</b>

East Leg Total: 15

East Entering: 7

East Peds: 0

Peds Cross: 0

Heavys	Trucks	Cars	Totals
0	0	0	0

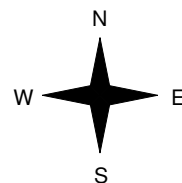


Lafleche Road

Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	0	0
0	0	0	0



GFL Scale Access 1



Cars	Trucks	Heavys	Totals
3	1	3	7
0	0	0	0
3	1	3	

Lafleche Road



Cars	Trucks	Heavys	Totals
4	1	3	8

Peds Cross: 0

West Peds: 0

West Entering: 0

West Leg Total: 0

## Comments

from 11:00 until 13:00 the road was closed on the east-west through direction

# Lafleche Road & GFL Scale Access 1

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000000018

**Intersection:** Lafleche Road & GFL Scale Access 1

**TFR File #:** 1

**Count date:** 18-Apr-2020

**Weather conditions:**

Clear

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Lafleche Road runs W/E

North Leg Total: 20

North Entering: 10

North Peds: 0

Peds Cross: 0

Heavys	0	4	4
Trucks	0	1	1
Cars	0	5	5
Totals	0	10	

Heavys	5
Trucks	1
Cars	4
Totals	10

East Leg Total: 20

East Entering: 10

East Peds: 0

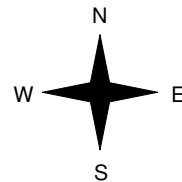
Peds Cross: 0

Heavys	Trucks	Cars	Totals
0	0	0	0



Lafleche Road

Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	0	0
0	0	0	



GFL Scale Access 1

Cars	Trucks	Heavys	Totals
4	1	5	10
0	0	0	0
4	1	5	

Lafleche Road



Cars	Trucks	Heavys	Totals
5	1	4	10

Peds Cross: 0

West Peds: 0

West Entering: 0

West Leg Total: 0

## Comments

from 11:00 until 13:00 the road was closed on the east-west through direction

# Lafleche Road & GFL Scale Access 1

## Traffic Count Summary

Intersection: Lafleche Road & GFL Scale Access					Count Date: 18-Apr-2020		Municipality: North Stormont					
North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	3	0	0	3	0	3	12:00:00	0	0	0	0	0
13:00:00	7	0	0	7	0	7	13:00:00	0	0	0	0	0

# Highway 138 & Lafleche Road

## Morning Peak Diagram

### Specified Period

**From:** 7:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 7:45:00

**To:** 8:45:00

**Municipality:** North Stormont

**Site #:** 0000009503

**Intersection:** Highway 138 & Lafleche Road

**TFR File #:** 1

**Count date:** 29-Nov-2016

### Weather conditions:

Cloudy / Rain

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 360

North Entering: 169

North Peds: 0

Peds Cross:  $\nless$

Heavys	4	14	5	23
Trucks	2	11	3	16
Cars	3	121	6	130
Totals	9	146	14	

Heavys	24
Trucks	14
Cars	153
Totals	191

East Leg Total: 74

East Entering: 38

East Peds: 0

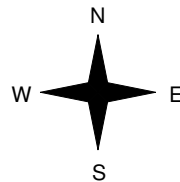
Peds Cross:  $\nless$

Heavys	Trucks	Cars	Totals
9	15	8	32



Lafleche Road

Heavys	Trucks	Cars	Totals
3	2	1	6
0	11	0	11
3	0	2	5
6	13	3	



Highway 138

Cars	Trucks	Heavys	Totals
6	3	1	10
0	11	2	13
8	7	0	15
14	21	3	

Allaire Road



Cars	Trucks	Heavys	Totals
13	18	5	36

Peds Cross:  $\nless$

West Peds: 0

West Entering: 22

West Leg Total: 54

Cars	131	Cars	5	146	7	158
Trucks	18	Trucks	2	9	4	15
Heavys	17	Heavys	3	20	0	23
Totals	166	Totals	10	175	11	

Peds Cross:  $\nless$

South Peds: 0

South Entering: 196

South Leg Total: 362

## Comments

# Highway 138 & Lafleche Road

## Afternoon Peak Diagram

### Specified Period

From: 16:00:00

To: 18:00:00

### One Hour Peak

From: 16:00:00

To: 17:00:00

**Municipality:** North Stormont

**Site #:** 0000009503

**Intersection:** Highway 138 & Lafleche Road

**TFR File #:** 1

**Count date:** 29-Nov-2016

### Weather conditions:

Cloudy / Rain

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 490

North Entering: 283

North Peds: 0

Peds Cross: 0

Heavys	2	16	2	20
Trucks	1	5	2	8
Cars	3	246	6	255
Totals	6	267	10	



Heavys	17
Trucks	12
Cars	178
Totals	207

East Leg Total: 50

East Entering: 30

East Peds: 0

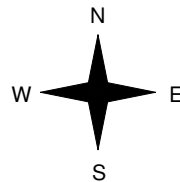
Peds Cross: 0

Heavys	Trucks	Cars	Totals
3	5	6	14



Lafleche Road

Heavys	Trucks	Cars	Totals
0	1	6	7
0	4	2	6
3	7	14	24
3	12	22	



Highway 138

Highway 138

Cars	Trucks	Heavys	Totals
12	1	1	14
0	1	0	1
12	2	1	15
24	4	2	

Allaire Road



Cars	Trucks	Heavys	Totals
8	8	4	20

Peds Cross: 0

West Peds: 0

West Entering: 37

West Leg Total: 51

Cars	272	Cars	3	160	0	163
Trucks	14	Trucks	3	10	2	15
Heavys	20	Heavys	1	16	2	19
Totals	306	Totals	7	186	4	



Peds Cross: 0

South Peds: 0

South Entering: 197

South Leg Total: 503

## Comments

# Highway 138 & Lafleche Road

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000009503

**Intersection:** Highway 138 & Lafleche Road

**TFR File #:** 1

**Count date:** 29-Nov-2016

**Weather conditions:**

Cloudy / Rain

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 1620

North Entering: 857

North Peds: 0

Peds Cross:  $\nlessgtr$

Heavys	12	50	7	69
Trucks	4	25	8	37
Cars	9	727	15	751
Totals	25	802	30	



Heavys	63
Trucks	45
Cars	655
Totals	763

East Leg Total: 178

East Entering: 94

East Peds: 0

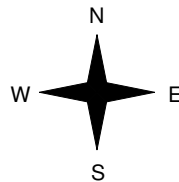
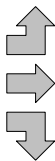
Peds Cross:  $\nlessgtr$

Heavys	Trucks	Cars	Totals
20	25	25	70



Lafleche Road

Heavys	Trucks	Cars	Totals
8	7	11	26
1	19	3	23
12	12	38	62
21	38	52	



Highway 138

Cars	Trucks	Heavys	Totals
24	6	4	34
0	16	2	18
30	10	2	42
54	32	8	

Allaire Road



Cars	Trucks	Heavys	Totals
34	39	11	84

Peds Cross:  $\nlessgtr$

West Peds: 0

West Entering: 111

West Leg Total: 181

Cars	795	Cars	16	620	16	652
Trucks	47	Trucks	5	32	12	49
Heavys	64	Heavys	6	51	3	60
Totals	906	Totals	27	703	31	



Highway 138

Peds Cross:  $\nlessgtr$

South Peds: 0

South Entering: 761

South Leg Total: 1667

**Comments**

# Highway 138 & Lafleche Road

## Traffic Count Summary

Intersection: Highway 138 & Lafleche Road

Count Date: 29-Nov-2016

Municipality: North Stormont

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	6	133	8	147	0	343	8:00:00	12	169	15	196	0
9:00:00	12	152	10	174	0	369	9:00:00	8	178	9	195	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	10	267	6	283	0	480	17:00:00	7	186	4	197	0
18:00:00	2	250	1	253	0	426	18:00:00	0	170	3	173	0

### Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	18:00	18:00	18:00	18:00
Crossing Values:	0	22	30	0	28	14	14	14	

# Highway 138 & Lafleche Road

## Mid-day Peak Diagram

### Specified Period

From: 10:00:00

To: 13:00:00

### One Hour Peak

From: 10:00:00

To: 11:00:00

**Municipality:** North Stormont

**Site #:** 0000009503

**Intersection:** Highway 138 & Lafleche Road

**TFR File #:** 1

**Count date:** 3-Dec-2016

### Weather conditions:

Cloudy

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 437

North Entering: 203

North Peds: 0

Peds Cross: 0

Heavys	0	3	0	3
Trucks	3	1	0	4
Cars	7	188	1	196
Totals	10	192	1	

Heavys 7

Trucks 4

Cars 223

Totals 234

East Leg Total: 6

East Entering: 4

East Peds: 0

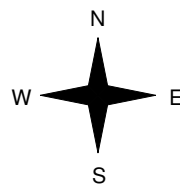
Peds Cross: 0

Heavys	Trucks	Cars	Totals
1	4	9	14



Lafleche Road

Heavys	Trucks	Cars	Totals
2	1	6	9
0	0	0	0
0	0	5	5
2	1	11	



Highway 138

Cars	Trucks	Heavys	Totals
2	0	0	2
0	0	0	0
2	0	0	2
4	0	0	

Allaire Road

Cars	Trucks	Heavys	Totals
2	0	0	2

Peds Cross: 0

West Peds: 0

West Entering: 14

West Leg Total: 28

Cars 195

Trucks 1

Heavys 3

Totals 199



Cars	2	215	1	218
Trucks	1	3	0	4
Heavys	1	5	0	6
Totals	4	223	1	

Peds Cross: 0

South Peds: 0

South Entering: 228

South Leg Total: 427

## Comments

# Highway 138 & Lafleche Road

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000009503

**Intersection:** Highway 138 & Lafleche Road

**TFR File #:** 1

**Count date:** 3-Dec-2016

**Weather conditions:**

Cloudy

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 1286

North Entering: 622

North Peds: 0

Peds Cross:  $\nlessgtr$

Heavys	1	10	0	11
Trucks	5	6	1	12
Cars	15	580	4	599
Totals	21	596	5	

Heavys 18

Trucks 12

Cars 634

Totals 664

East Leg Total: 21

East Entering: 12

East Peds: 0

Peds Cross:  $\nlessgtr$

Heavys	Trucks	Cars	Totals
3	6	23	32

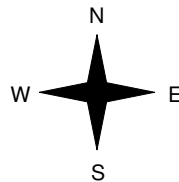


Lafleche Road

Heavys	Trucks	Cars	Totals
4	4	13	21
0	0	1	1
1	1	13	15
5	5	27	



Highway 138



Cars	Trucks	Heavys	Totals
9	0	0	9
0	0	0	0
3	0	0	3
12	0	0	

Allaire Road



Cars	Trucks	Heavys	Totals
8	1	0	9

Peds Cross:  $\nlessgtr$

West Peds: 0

West Entering: 37

West Leg Total: 69

Cars	596	Cars	8	612	3	623
Trucks	7	Trucks	1	8	0	9
Heavys	11	Heavys	2	14	0	16
Totals	614	Totals	11	634	3	



Peds Cross:  $\nlessgtr$

South Peds: 0

South Entering: 648

South Leg Total: 1262

**Comments**

# Highway 138 & Lafleche Road

## Traffic Count Summary

Intersection: Highway 138 & Lafleche Road

Count Date: 3-Dec-2016

Municipality: North Stormont

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
10:00:00	0	0	0	0	0	0	10:00:00	0	0	0	0	0
11:00:00	1	192	10	203	0	431	11:00:00	4	223	1	228	0
12:00:00	3	177	5	185	0	406	12:00:00	5	216	0	221	0
13:00:00	1	227	6	234	0	433	13:00:00	2	195	2	199	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
10:00:00	0	0	0	0	0	0	10:00:00	0	0	0	0	0
11:00:00	2	0	2	4	0	18	11:00:00	9	0	5	14	0
12:00:00	0	0	3	3	0	15	12:00:00	7	1	4	12	0
13:00:00	1	0	4	5	0	16	13:00:00	5	0	6	11	0

### Calculated Values for Traffic Crossing Major Street

Hours Ending:	10:00	10:00	11:00	11:00	12:00	12:00	13:00	13:00
Crossing Values:	0	0	11	11	8	8	6	6

# Highway 138 & Highway 417 EB Off-Ramp

## Morning Peak Diagram

### Specified Period

**From:** 7:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 8:00:00

**To:** 9:00:00

**Municipality:** North Stormont

**Site #:** 0000009502

**Intersection:** Highway 138 & Highway 417 EB Off-Ramp

**TFR File #:** 1

**Count date:** 29-Nov-2016

**Weather conditions:**

Cloudy / Rain

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 232

North Entering: 54

North Peds: 0

Peds Cross: 0

Heavys	1	9	10
Trucks	0	4	4
Cars	3	37	40
Totals	4	50	

Heavys 13

Trucks 10

Cars 155

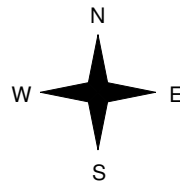
Totals 178

Heavys	Trucks	Cars	Totals
7	0	17	24



Highway 417 EB Off/On-Ramps

Heavys	Trucks	Cars	Totals
0	0	4	4
15	14	90	119
15	14	94	



Highway 138

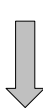
Peds Cross: 0

West Peds: 0

West Entering: 123

West Leg Total: 147

Cars	127
Trucks	18
Heavys	24
Totals	169



Cars	14	151
Trucks	0	10
Heavys	6	13
Totals	20	174

Peds Cross: 0

South Peds: 0

South Entering: 194

South Leg Total: 363

## Comments

# Highway 138 & Highway 417 EB Off-Ramp

## Afternoon Peak Diagram

### Specified Period

From: 16:00:00

To: 18:00:00

### One Hour Peak

From: 16:00:00

To: 17:00:00

**Municipality:** North Stormont

**Site #:** 0000009502

**Intersection:** Highway 138 & Highway 417 EB Off-Ramp

**TFR File #:** 1

**Count date:** 29-Nov-2016

### Weather conditions:

Cloudy / Rain

### Person(s) who counted:

### \*\* Non-Signalized Intersection \*\*

**Major Road:** Highway 138 runs N/S

North Leg Total: 268

North Entering: 63

North Peds: 0

Peds Cross: 0

Heavys	0	6	6
Trucks	1	3	4
Cars	5	48	53
Totals	6	57	



Heavys	13
Trucks	14
Cars	178
Totals	205

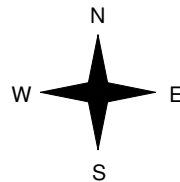
Heavys	Trucks	Cars	Totals
3	1	24	28



Highway 138



Highway 417 EB Off/On-Ramps



Heavys	Trucks	Cars	Totals
0	2	10	12
16	6	215	237
16	8	225	



Highway 138



Peds Cross: 0  
West Peds: 0  
West Entering: 249  
West Leg Total: 277

Cars	263
Trucks	9
Heavys	22
Totals	294



Cars	19	168	187
Trucks	0	12	12
Heavys	3	13	16
Totals	22	193	

Peds Cross: 0  
South Peds: 0  
South Entering: 215  
South Leg Total: 509

## Comments

# Highway 138 & Highway 417 EB Off-Ramp

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000009502

**Intersection:** Highway 138 & Highway 417 EB Off-Ramp

**TFR File #:** 1

**Count date:** 29-Nov-2016

**Weather conditions:**

Cloudy / Rain

**Person(s) who counted:**


**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 950

North Entering: 217

North Peds: 0

Peds Cross: 

Heavys	1	25
Trucks	1	10
Cars	22	158
Totals	24	193

26  
11  
180



Heavys	51
Trucks	43
Cars	639
Totals	733

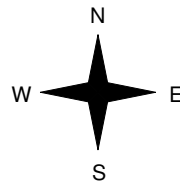
Heavys	Trucks	Cars	Totals
16	5	79	100



Highway 138




Highway 417 EB Off/On-Ramps



Heavys	Trucks	Cars	Totals
1	5	28	34
46	29	599	674
47	34	627	



Highway 138

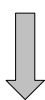
Peds Cross: 

West Peds: 0


West Entering: 708

West Leg Total: 808

Cars	757
Trucks	39
Heavys	71
Totals	867



Cars	57	611
Trucks	4	38
Heavys	15	50
Totals	76	699

Peds Cross: 

South Peds: 0

South Entering: 775

South Leg Total: 1642

**Comments**

# Highway 138 & Highway 417 EB Off-Ramp Traffic Count Summary

Intersection: Highway 138 & Highway 417 EB C      Count Date: 29-Nov-2016      Municipality: North Stormont

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	43	6	49	0	229	8:00:00	21	159	0	180	0
9:00:00	0	50	4	54	0	248	9:00:00	20	174	0	194	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	0	57	6	63	0	278	17:00:00	22	193	0	215	0
18:00:00	0	43	8	51	0	237	18:00:00	13	173	0	186	0

# Highway 138 & Highway 417 EB Off-Ramp

## Mid-day Peak Diagram

### Specified Period

**From:** 10:00:00

**To:** 13:00:00

### One Hour Peak

**From:** 10:15:00

**To:** 11:15:00

**Municipality:** North Stormont

**Site #:** 0000009502

**Intersection:** Highway 138 & Highway 417 EB Off

**TFR File #:** 1

**Count date:** 3-Dec-2016

**Weather conditions:**

Cloudy

**Person(s) who counted:**


**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 283

North Entering: 59

North Peds: 0

Peds Cross: 

Heavys	2	0	2
Trucks	1	0	1
Cars	9	47	56
<b>Totals</b>	<b>12</b>	<b>47</b>	



Heavys	2
Trucks	4
Cars	218
<b>Totals</b>	<b>224</b>

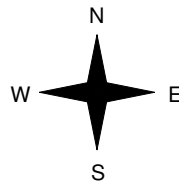
Heavys	Trucks	Cars	Totals
5	1	22	28



Highway 138




Highway 417 EB Off/On-Ramps



Heavys	Trucks	Cars	Totals
0	0	5	5
2	2	150	154
2	2	155	



Highway 138

Peds Cross: 

West Peds: 0


West Entering: 159

West Leg Total: 187

Cars	197
Trucks	2
Heavys	2
<b>Totals</b>	<b>201</b>



Cars	13	213	226
Trucks	0	4	4
Heavys	3	2	5
<b>Totals</b>	<b>16</b>	<b>219</b>	

Peds Cross: 

South Peds: 0

South Entering: 235

South Leg Total: 436

## Comments

# Highway 138 & Highway 417 EB Off-Ramp

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000009502

**Intersection:** Highway 138 & Highway 417 EB Off

**TFR File #:** 1

**Count date:** 3-Dec-2016

**Weather conditions:**

Cloudy

**Person(s) who counted:**


**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 803

North Entering: 160

North Peds: 0

Peds Cross: 

Heavys	2	1	3
Trucks	1	3	4
Cars	18	135	153
Totals	21	139	



Heavys	12
Trucks	10
Cars	621
Totals	643

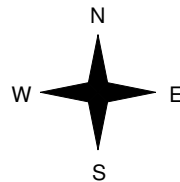
Heavys	Trucks	Cars	Totals
9	1	54	64



Highway 138




Highway 417 EB Off/On-Ramps



Heavys	Trucks	Cars	Totals
0	0	15	15
10	8	464	482
10	8	479	



Highway 138

Peds Cross: 

West Peds: 0


West Entering: 497

West Leg Total: 561

Cars	599
Trucks	11
Heavys	11
Totals	621



Cars	36	606
Trucks	0	10
Heavys	7	12
Totals	43	628

Peds Cross: 

South Peds: 0

South Entering: 671

South Leg Total: 1292

**Comments**

# Highway 138 & Highway 417 EB Off-Ramp Traffic Count Summary

Intersection: Highway 138 & Highway 417 EB O Count Date: 3-Dec-2016 Municipality: North Stormont

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
10:00:00	0	0	0	0	0	0	10:00:00	0	0	0	0	0
11:00:00	0	47	8	55	0	289	11:00:00	17	217	0	234	0
12:00:00	0	37	8	45	0	273	12:00:00	12	216	0	228	0
13:00:00	0	55	5	60	0	269	13:00:00	14	195	0	209	0

# Highway 138 & Highway 417 WB Off-Ramp

## Morning Peak Diagram

### Specified Period

**From:** 7:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 7:15:00

**To:** 8:15:00

**Municipality:** North Stormont

**Site #:** 0000009501

**Intersection:** Highway 138 & Highway 417 WB Off-Ramp

**TFR File #:** 1

**Count date:** 29-Nov-2016

### Weather conditions:

Cloudy / Rain

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 79

North Entering: 36

North Peds: 0

Peds Cross:  $\infty$

Heavys	2	0	2
Trucks	3	0	3
Cars	25	6	31
Totals	30	6	



Heavys	5
Trucks	9
Cars	29
Totals	43

East Leg Total: 186

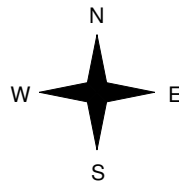
East Entering: 38

East Peds: 0

Peds Cross:  $\infty$



Highway 138



Cars	Trucks	Heavys	Totals
6	3	1	10
21	3	4	28
27	6	5	



Highway 417 WB Off/On-Ramps



Cars	Trucks	Heavys	Totals
129	6	13	148

Highway 138



Cars	46	Cars	23	123	146
Trucks	6	Trucks	6	6	12
Heavys	6	Heavys	4	13	17
Totals	58	Totals	33	142	



Peds Cross:  $\infty$

South Peds: 0

South Entering: 175

South Leg Total: 233

## Comments

# Highway 138 & Highway 417 WB Off-Ramp

## Afternoon Peak Diagram

### Specified Period

From: 16:00:00

To: 18:00:00

### One Hour Peak

From: 16:00:00

To: 17:00:00

**Municipality:** North Stormont

**Site #:** 0000009501

**Intersection:** Highway 138 & Highway 417 WB Off-Ramp

**TFR File #:** 1

**Count date:** 29-Nov-2016

**Weather conditions:**

Cloudy / Rain

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 106

North Entering: 50

North Peds: 0

Peds Cross: 0

Heavys	2	0	2
Trucks	5	0	5
Cars	34	9	43
Totals	41	9	



Heavys	2
Trucks	8
Cars	46
Totals	56

East Leg Total: 192

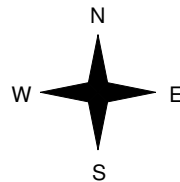
East Entering: 29

East Peds: 0

Peds Cross: 0



Highway 138



Cars	Trucks	Heavys	Totals
1	3	1	5
20	0	4	24
21	3	5	



Highway 417 WB Off/On-Ramps

Cars	Trucks	Heavys	Totals
141	11	11	163

Highway 138



Cars	54	Cars	45	132	177
Trucks	5	Trucks	5	11	16
Heavys	6	Heavys	1	11	12
Totals	65	Totals	51	154	



Peds Cross: 0

South Peds: 0

South Entering: 205

South Leg Total: 270

## Comments

# Highway 138 & Highway 417 WB Off-Ramp

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000009501

**Intersection:** Highway 138 & Highway 417 WB Off-Ramp

**TFR File #:** 1

**Count date:** 29-Nov-2016

**Weather conditions:**

Cloudy / Rain

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 323

North Entering: 143

North Peds: 0

Peds Cross: 0

Heavys	8	0	8
Trucks	8	1	9
Cars	104	22	126
Totals	120	23	



Heavys	9
Trucks	24
Cars	147
Totals	180

East Leg Total: 728

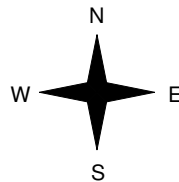
East Entering: 126

East Peds: 0

Peds Cross: 0



Highway 138



Cars	Trucks	Heavys	Totals
19	7	2	28
78	4	16	98
97	11	18	



Highway 417 WB Off/On-Ramps

Cars	Trucks	Heavys	Totals
531	28	43	602

Highway 138



Cars	182	Cars	128	509	637
Trucks	12	Trucks	17	27	44
Heavys	24	Heavys	7	43	50
Totals	218	Totals	152	579	



Peds Cross: 0

South Peds: 0

South Entering: 731

South Leg Total: 949

**Comments**

# Highway 138 & Highway 417 WB Off-Ramp Traffic Count Summary

Intersection: Highway 138 & Highway 417 WB C    Count Date: 29-Nov-2016    Municipality: North Stormont

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	4	29	0	33	0	201	8:00:00	0	25	143	168	0
9:00:00	8	27	0	35	0	215	9:00:00	0	33	147	180	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	9	41	0	50	0	255	17:00:00	0	51	154	205	0
18:00:00	2	23	0	25	0	203	18:00:00	0	43	135	178	0

# Highway 138 & Highway 417 WB Off-Ramp

## Mid-day Peak Diagram

### Specified Period

**From:** 10:00:00

**To:** 13:00:00

### One Hour Peak

**From:** 10:15:00

**To:** 11:15:00

**Municipality:** North Stormont

**Site #:** 0000009501

**Intersection:** Highway 138 & Highway 417 WB Off-Ramp

**TFR File #:** 1

**Count date:** 3-Dec-2016

### Weather conditions:

Cloudy

### Person(s) who counted:

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 78

North Entering: 47

North Peds: 0

Peds Cross:  $\infty$

Heavys	2	0	2
Trucks	1	1	2
Cars	36	7	43
Totals	39	8	



Heavys	1
Trucks	2
Cars	28
Totals	31

East Leg Total: 230

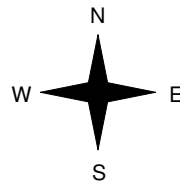
East Entering: 25

East Peds: 0

Peds Cross:  $\infty$



Highway 138



Cars	Trucks	Heavys	Totals
2	1	0	3
22	0	0	22
24	1	0	



Highway 417 WB Off/On-Ramps



Cars	Trucks	Heavys	Totals
200	4	1	205

Highway 138



Cars	58	Cars	26	193	219
Trucks	1	Trucks	1	3	4
Heavys	2	Heavys	1	1	2
Totals	61	Totals	28	197	



Peds Cross:  $\infty$

South Peds: 0

South Entering: 225

South Leg Total: 286

## Comments

# Highway 138 & Highway 417 WB Off-Ramp

## Total Count Diagram

**Municipality:** North Stormont

**Site #:** 0000009501

**Intersection:** Highway 138 & Highway 417 WB Off-Ramp

**TFR File #:** 1

**Count date:** 3-Dec-2016

**Weather conditions:**

Cloudy

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Highway 138 runs N/S

North Leg Total: 212

North Entering: 117

North Peds: 0

Peds Cross:  $\nlessgtr$

Heavys	2	0	2
Trucks	2	1	3
Cars	87	25	112
Totals	91	26	

Heavys	1
Trucks	5
Cars	89
Totals	95

East Leg Total: 684

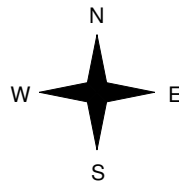
East Entering: 89

East Peds: 0

Peds Cross:  $\nlessgtr$



Highway 138



Cars	Trucks	Heavys	Totals
18	3	0	21
65	2	1	68
83	5	1	



Highway 417 WB Off/On-Ramps

Cars	Trucks	Heavys	Totals
574	10	11	595

Highway 138

Cars	152
Trucks	4
Heavys	3
Totals	159



Cars	71	549	620
Trucks	2	9	11
Heavys	1	11	12
Totals	74	569	

Peds Cross:  $\nlessgtr$

South Peds: 0

South Entering: 643

South Leg Total: 802

**Comments**

# Highway 138 & Highway 417 WB Off-Ramp Traffic Count Summary

Intersection: Highway 138 & Highway 417 WB C      Count Date: 3-Dec-2016      Municipality: North Stormont

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
10:00:00	0	0	0	0	0	0	10:00:00	0	0	0	0	0
11:00:00	10	36	0	46	0	267	11:00:00	0	25	196	221	0
12:00:00	11	31	0	42	0	267	12:00:00	0	26	199	225	0
13:00:00	5	24	0	29	0	226	13:00:00	0	23	174	197	0












# **Appendix B**

## **Synchro Reports**

### HCM Unsignalized Intersection Capacity Analysis

#### 3: Highway 138 & Hwy 417 WB Off-Ramp










08/21/2020

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	35	12	40	0	8	37
Future Volume (Veh/h)	35	12	40	0	8	37
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	39	13	44	0	9	41
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	103	44			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	103	44			44	
tC, single (s)	6.6	6.6			4.1	
tC, 2 stage (s)						
tF (s)	3.7	3.7			2.2	
p0 queue free %	95	99			99	
cM capacity (veh/h)	838	928			1577	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	52	44	50			
Volume Left	39	0	9			
Volume Right	13	0	0			
cSH	858	1700	1577			
Volume to Capacity	0.06	0.03	0.01			
Queue Length 95th (m)	1.5	0.0	0.1			
Control Delay (s)	9.5	0.0	1.3			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.3			
Approach LOS	A					
Intersection Summary						
Average Delay		3.8				
Intersection Capacity Utilization		18.8%		ICU Level of Service	A	
Analysis Period (min)		15				

### HCM Unsignalized Intersection Capacity Analysis

#### 5: Highway 138 & Hwy 417 EB Off-Ramp



















08/21/2020

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	25	212	61	5
Future Volume (Veh/h)	5	0	25	212	61	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	0	27	226	65	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	348	68	70			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348	68	70			
tC, single (s)	6.4	6.2	4.4			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.5			
p0 queue free %	99	100	98			
cM capacity (veh/h)	641	1002	1370			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	5	253	70			
Volume Left	5	27	0			
Volume Right	0	0	5			
cSH	641	1370	1700			
Volume to Capacity	0.01	0.02	0.04			
Queue Length 95th (m)	0.2	0.5	0.0			
Control Delay (s)	10.7	1.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.7	1.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		29.2%		ICU Level of Service	A	
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

9: Highway 138 & LaFleche Road










08/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	11	5	15	13	10	12	213	11	14	178	14
Future Volume (Veh/h)	8	11	5	15	13	10	12	213	11	14	178	14
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	9	12	5	16	14	11	13	234	12	15	196	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	504	498	196	497	501	234	211				246	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	504	498	196	497	501	234	211				246	
tC, single (s)	7.9	7.5	6.8	7.6	7.5	6.6	4.6				4.7	
tC, 2 stage (s)												
tF (s)	4.2	4.9	3.8	3.9	4.9	3.7	2.7				2.7	
p0 queue free %	97	97	99	96	96	98	99				99	
cM capacity (veh/h)	347	349	717	396	348	720	1120				1057	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	26	41	247	12	211	15						
Volume Left	9	16	13	0	15	0						
Volume Right	5	11	0	12	0	15						
cSH	386	427	1120	1700	1057	1700						
Volume to Capacity	0.07	0.10	0.01	0.01	0.01	0.01						
Queue Length 95th (m)	1.6	2.4	0.3	0.0	0.3	0.0						
Control Delay (s)	15.0	14.3	0.5	0.0	0.7	0.0						
Lane LOS	B	B	A		A							
Approach Delay (s)	15.0	14.3	0.5		0.7							
Approach LOS	B	B										
Intersection Summary												
Average Delay	2.3											
Intersection Capacity Utilization	31.0%			ICU Level of Service			A					
Analysis Period (min)	15											

# HCM Unsignalized Intersection Capacity Analysis

11: LaFleche Road & LaFleche Driveway

08/21/2020

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	18	16	25	12	0
Future Volume (Veh/h)	0	18	16	25	12	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	21	19	30	14	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	49				55	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	49				55	34
tC, single (s)	4.1				7.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				4.4	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1571				756	1045
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	21	49	14			
Volume Left	0	0	14			
Volume Right	0	30	0			
cSH	1571	1700	756			
Volume to Capacity	0.00	0.03	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.0	0.0	9.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay	1.6					
Intersection Capacity Utilization	13.3%			ICU Level of Service		A
Analysis Period (min)	15					

### HCM Unsignalized Intersection Capacity Analysis

#### 3: Highway 138 & Hwy 417 WB Off-Ramp

08/21/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑		↔	↔
Traffic Volume (veh/h)	29	6	62	0	11	50
Future Volume (Veh/h)	29	6	62	0	11	50
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	33	7	71	0	13	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	154	71			71	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	154	71			71	
tC, single (s)	6.6	7.0			4.1	
tC, 2 stage (s)						
tF (s)	3.7	4.0			2.2	
p0 queue free %	96	99			99	
cM capacity (veh/h)	797	811			1542	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	40	71	70			
Volume Left	33	0	13			
Volume Right	7	0	0			
cSH	799	1700	1542			
Volume to Capacity	0.05	0.04	0.01			
Queue Length 95th (m)	1.2	0.0	0.2			
Control Delay (s)	9.7	0.0	1.4			
Lane LOS	A		A			
Approach Delay (s)	9.7	0.0	1.4			
Approach LOS	A					
Intersection Summary						
Average Delay		2.7				
Intersection Capacity Utilization		19.9%		ICU Level of Service	A	
Analysis Period (min)		15				

### HCM Unsignalized Intersection Capacity Analysis

#### 5: Highway 138 & Hwy 417 EB Off-Ramp



















08/21/2020

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↑	↔	↔
Traffic Volume (veh/h)	15	0	27	235	69	8
Future Volume (Veh/h)	15	0	27	235	69	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	16	0	28	245	72	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	377	76	80			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	377	76	80			
tC, single (s)	6.6	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.7	3.3	2.3			
p0 queue free %	97	100	98			
cM capacity (veh/h)	584	991	1445			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	16	273	80			
Volume Left	16	28	0			
Volume Right	0	0	8			
cSH	584	1445	1700			
Volume to Capacity	0.03	0.02	0.05			
Queue Length 95th (m)	0.6	0.5	0.0			
Control Delay (s)	11.3	0.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.3	0.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		30.5%		ICU Level of Service	A	
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

9: Highway 138 & LaFleche Road










08/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	6	26	15	1	14	7	226	4	10	326	6
Future Volume (Veh/h)	11	6	26	15	1	14	7	226	4	10	326	6
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	11	6	27	16	1	15	7	235	4	10	340	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	624	613	340	639	615	235	346				239	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	624	613	340	639	615	235	346				239	
tC, single (s)	7.2	7.2	6.6	7.3	7.5	6.3	4.7				4.5	
tC, 2 stage (s)												
tF (s)	3.6	4.6	3.7	3.7	4.9	3.4	2.7				2.6	
p0 queue free %	97	98	96	95	100	98	99				99	
cM capacity (veh/h)	368	327	620	340	296	775	962				1134	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	44	32	242	4	350	6						
Volume Left	11	16	7	0	10	0						
Volume Right	27	15	0	4	0	6						
cSH	480	458	962	1700	1134	1700						
Volume to Capacity	0.09	0.07	0.01	0.00	0.01	0.00						
Queue Length 95th (m)	2.3	1.7	0.2	0.0	0.2	0.0						
Control Delay (s)	13.3	13.4	0.3	0.0	0.3	0.0						
Lane LOS	B	B	A		A							
Approach Delay (s)	13.3	13.4	0.3		0.3							
Approach LOS	B	B										
Intersection Summary												
Average Delay	1.8											
Intersection Capacity Utilization	35.2%			ICU Level of Service			A					
Analysis Period (min)	15											

# HCM Unsignalized Intersection Capacity Analysis

11: LaFleche Road & LaFleche Driveway

08/21/2020

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	6	2	4	35	0
Future Volume (Veh/h)	0	6	2	4	35	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.51	0.51	0.51	0.51	0.51	0.51
Hourly flow rate (vph)	0	12	4	8	69	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12				20	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12				20	8
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	100				93	100
cM capacity (veh/h)	1620				946	1080
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	12	12	69			
Volume Left	0	0	69			
Volume Right	0	8	0			
cSH	1620	1700	946			
Volume to Capacity	0.00	0.01	0.07			
Queue Length 95th (m)	0.0	0.0	1.8			
Control Delay (s)	0.0	0.0	9.1			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay	6.8					
Intersection Capacity Utilization	13.3%			ICU Level of Service		A
Analysis Period (min)	15					

### HCM Unsignalized Intersection Capacity Analysis

#### 3: Highway 138 & Hwy 417 WB Off-Ramp

08/21/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑		↔	↔
Traffic Volume (veh/h)	27	3	35	0	10	48
Future Volume (Veh/h)	27	3	35	0	10	48
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	3	38	0	11	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	112	38			38	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112	38			38	
tC, single (s)	6.4	6.5			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.3	
p0 queue free %	97	100			99	
cM capacity (veh/h)	883	952			1504	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	32	38	63			
Volume Left	29	0	11			
Volume Right	3	0	0			
cSH	889	1700	1504			
Volume to Capacity	0.04	0.02	0.01			
Queue Length 95th (m)	0.9	0.0	0.2			
Control Delay (s)	9.2	0.0	1.3			
Lane LOS	A		A			
Approach Delay (s)	9.2	0.0	1.3			
Approach LOS	A					
Intersection Summary						
Average Delay		2.8				
Intersection Capacity Utilization		19.7%		ICU Level of Service	A	
Analysis Period (min)		15				

### HCM Unsignalized Intersection Capacity Analysis

#### 5: Highway 138 & Hwy 417 EB Off-Ramp



















08/21/2020

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↑	↔	↔
Traffic Volume (veh/h)	6	0	19	267	57	15
Future Volume (Veh/h)	6	0	19	267	57	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	6	0	20	284	61	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	393	69	77			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	393	69	77			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	99	100	99			
cM capacity (veh/h)	607	1000	1421			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	6	304	77			
Volume Left	6	20	0			
Volume Right	0	0	16			
cSH	607	1421	1700			
Volume to Capacity	0.01	0.01	0.05			
Queue Length 95th (m)	0.2	0.3	0.0			
Control Delay (s)	11.0	0.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.0	0.6	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		0.7				
Intersection Capacity Utilization		31.8%		ICU Level of Service	A	
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

9: Highway 138 & LaFleche Road




08/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	5	2	0	2	4	272	1	1	234	10
Future Volume (Veh/h)	9	0	5	2	0	2	4	272	1	1	234	10
Sign Control	Stop				Stop		Free			Free		
Grade	0%				0%		0%			0%		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	9	0	5	2	0	2	4	283	1	1	244	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	539	538	244	542	547	283	254				284	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	539	538	244	542	547	283	254				284	
tC, single (s)	7.4	6.5	6.2	7.1	6.5	6.2	4.6				4.1	
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.3	3.5	4.0	3.3	2.7				2.2	
p0 queue free %	98	100	99	100	100	100	100				100	
cM capacity (veh/h)	406	451	800	450	445	761	1077				1290	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	14	4	287	1	245	10						
Volume Left	9	2	4	0	1	0						
Volume Right	5	2	0	1	0	10						
cSH	493	565	1077	1700	1290	1700						
Volume to Capacity	0.03	0.01	0.00	0.00	0.00	0.01						
Queue Length 95th (m)	0.7	0.2	0.1	0.0	0.0	0.0						
Control Delay (s)	12.5	11.4	0.2	0.0	0.0	0.0						
Lane LOS	B	B	A	A								
Approach Delay (s)	12.5	11.4	0.2	0.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay				0.5								
Intersection Capacity Utilization				31.2%	ICU Level of Service			A				
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

11: LaFleche Road & LaFleche Driveway

08/21/2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	7	8	0
Future Volume (Veh/h)	0	0	0	7	8	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	0	0	9	11	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	9				4	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	9				4	4
tC, single (s)	4.1				6.9	6.2
tC, 2 stage (s)						
tF (s)	2.2				4.0	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1624				906	1085
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	0	9	11			
Volume Left	0	0	11			
Volume Right	0	9	0			
cSH	1700	1700	906			
Volume to Capacity	0.00	0.01	0.01			
Queue Length 95th (m)	0.0	0.0	0.3			
Control Delay (s)	0.0	0.0	9.0			
Lane LOS				A		
Approach Delay (s)	0.0	0.0	9.0			
Approach LOS				A		
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			



# **Appendix C**

## Weigh Scale Data Processing

Summary Material Activity Report

April 16, 2020 to April 16, 2020

All Ticket Types

\* -

History and Waiting

Selected Reporting Groups

All Facilities

H3-COMPOST IN

Material	Weight	Outbound	Volume Inbound	Count			Billing Qty	Material Total	Load Count
	Inbound			Outbound	Inbound	Outbound			
TRANSPORTATION	183.10	0.00	MT	0.00	0.00	YD	0.00	0.00	8
COMPOST - FOOD WASTE - COMMERCIAL	460.73	0.00	MT	0.00	0.00	YD	0.00	0.00	13
WOOD CHIPS	24.18	0.00	MT	0.00	0.00	YD	0.00	0.00	1
YARDWASTE	399.94	0.00	MT	0.00	0.00	YD	0.00	0.00	17
	1,067.95	0.00	MT	0.00	0.00	YD	0.00	0.00	31

GVANLOENEN 04/23/2020 9:55 AM

GFL10 - Moose Creek Trsf (WIT)

Note that Transportation is a second count of a load, done for billing purposes. For total count on the day, transportation should be subtracted. In this case, a total of 31 trucks came to site on April 16, 2020, with compost waste material.

Summary Material Activity Report

April 18, 2020 to April 18, 2020

All Ticket Types

\* -

Selected Reporting Groups

History and Waiting

All Facilities

H3-COMPOST IN

Material	Weight	Outbound	Volume Inbound	Count			Billing Qty	Material Total	Load Count
	Inbound			Outbound	Inbound	Outbound			
TRANSPORTATION	88.41	0.00	MT	0.00	0.00	YD	0.00	0.00	4
COMPOST - FOOD WASTE - COMMERCIAL	312.97	0.00	MT	0.00	0.00	YD	0.00	0.00	9
YARDWASTE	161.26	0.00	MT	0.00	0.00	YD	0.00	0.00	7
	562.64	0.00	MT	0.00	0.00	YD	0.00	0.00	16

Note that Transportation is a second count of a load, done for billing purposes.

# Summary Material Activity Report

April 16, 2020 to April 16, 2020

\* -

All Ticket Types

Selected Reporting Groups

History and Waiting

All Facilities

## H3-WASTE IN

Material	Weight			Volume			Count		Billing Qty	Material Total	Load Count
	Inbound	Outbound		Inbound	Outbound		Outbound	Inbound Outbound			
CONST. & DEMO.	94.24	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	94.24	3
ASBESTOS	44.00	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	44.00	3
ICI	917.61	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	917.61	45
MSW	531.94	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	531.94	26
COVER MATERIAL	105.31	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	105.31	4
SPECIAL WASTE	10.24	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	10.24	1
SRM - SPECIFIC RISK MATERIAL	14.02	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	14.02	1
	1,717.36	0.00	MT	0.00	0.00	YD	0.00	0.00	0.00	1,717.36	83

GVANLOENEN 04/23/2020 10:52 AM

GFL10 - Moose Creek Trsf (WIT)

Summary Material Activity Report

April 18, 2020 to April 18, 2020

All Ticket Types

\* -

History and Waiting

Selected Reporting Groups

All Facilities

H3-WASTE IN

Material	Weight			Volume			Count			Billing Qty	Material Total	Load Count
	Inbound	Outbound		Inbound	Outbound		Outbound	Inbound	Outbound			
ICI	45.11	0.00	MT		0.00		0.00		YD	0.00	45.11	2
MSW	61.24	0.00	MT		0.00		0.00		YD	0.00	61.24	3
	106.35	0.00	MT		0.00		0.00		YD	0.00	106.35	5

# **Appendix D**

## **Site Trip Assignment**

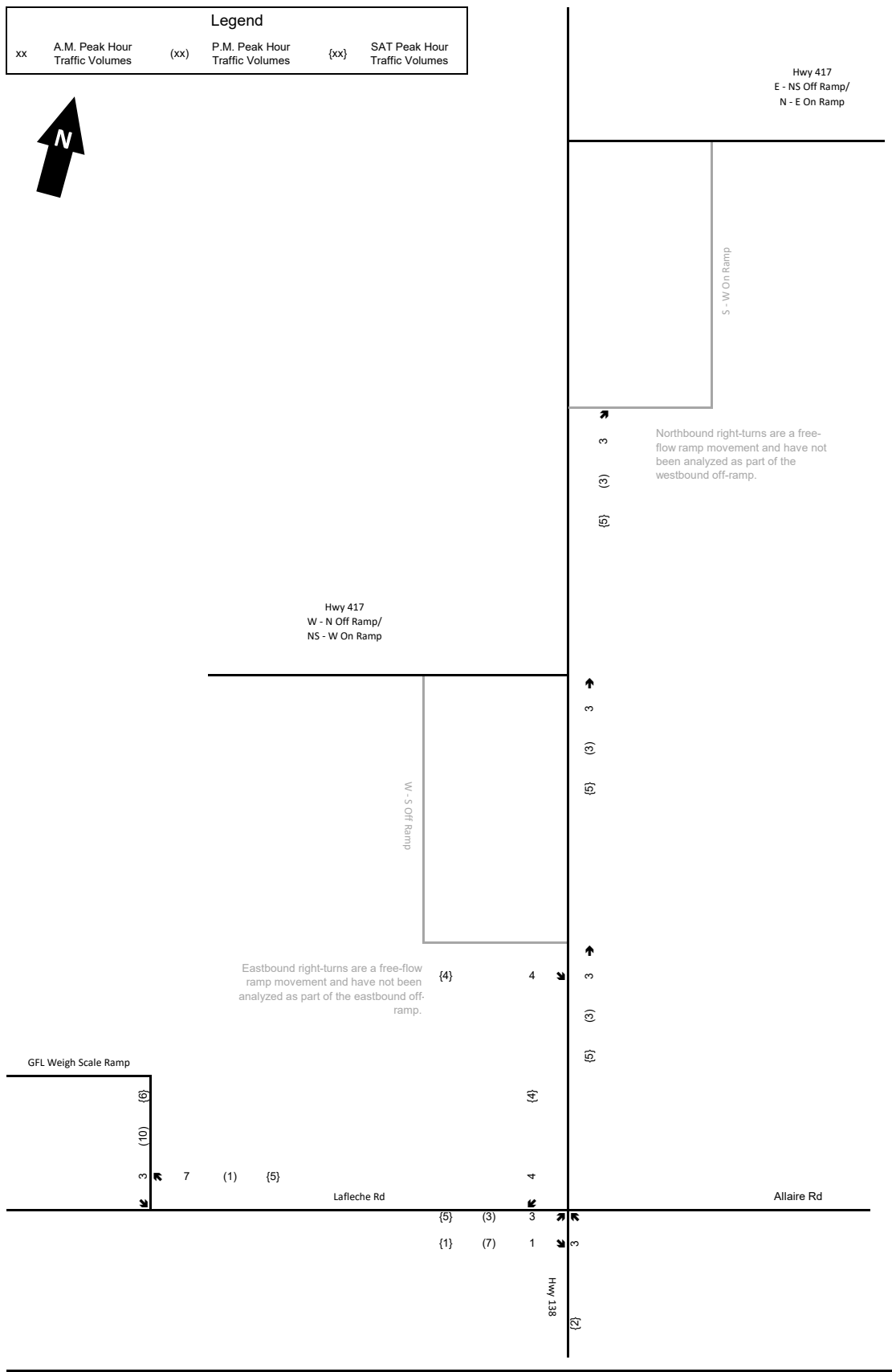


Figure Existing Compost

Existing trips associated with compost waste



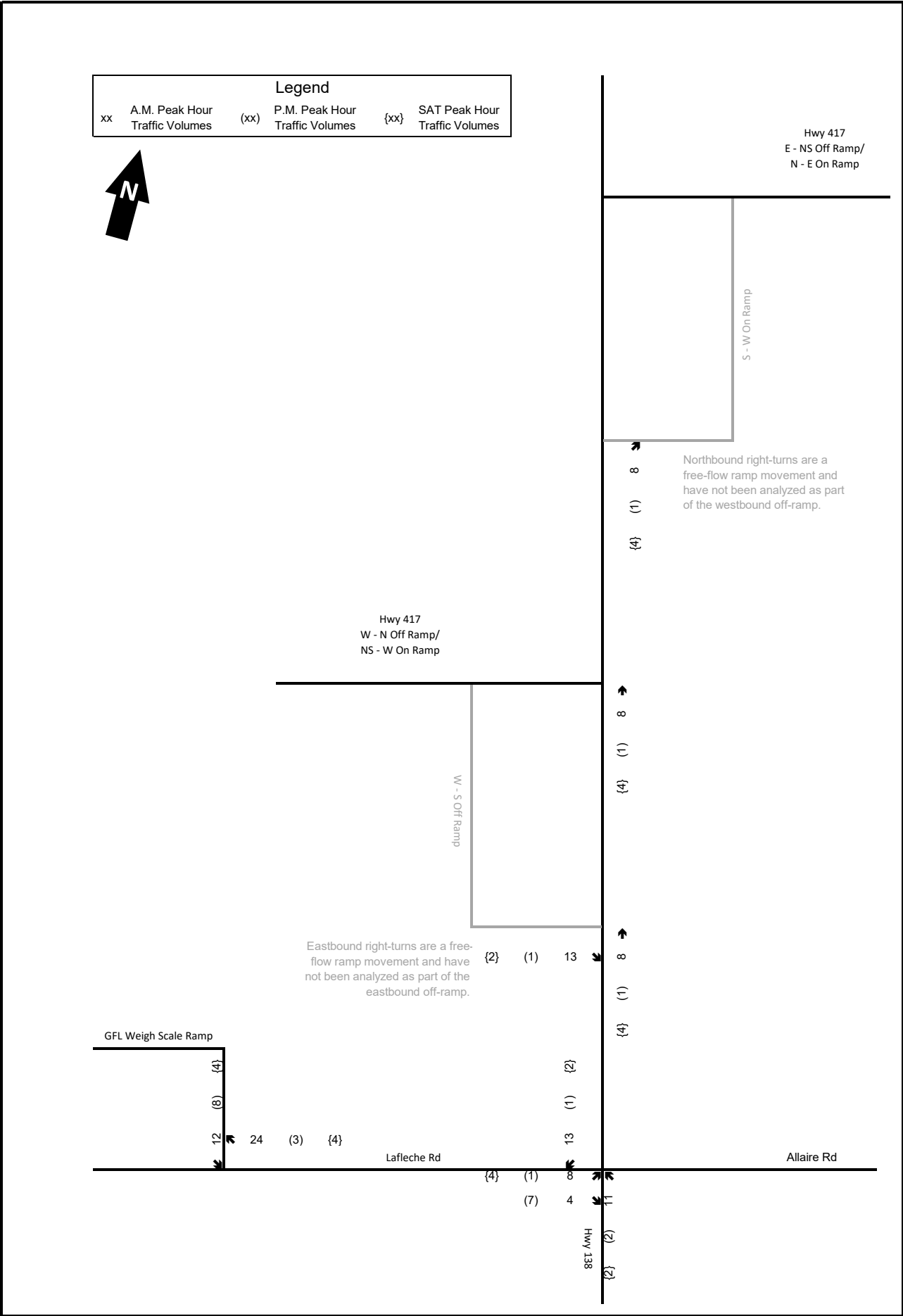


Figure Existing Site Heavys  
Heavy Vehicles that currently use the GFL Weigh Scale  
Ramp

